WSR-88D Program Software Changes
That May Impact
Radar Product Central Collection Dissemination Service (RPCCDS) Users

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# PURPOSE:

This summary is intended to assist RPCCDS users plan for WSR-88D changes which may impact data format, data frequency, or data quality. While many changes are made to the WSR-88D Radar Product Generator (RPG) in software issued during the 6-month software release cycle, only a small subset may affect RPCCDS users. The changes made in each RPG software build are listed at: http://www.roc.noaa.gov/ssb/cm/software/.

There are no plans to add to or delete products available on the RPCCDS. No format changes for products on the RPCCDS are planned.

# CURRENT:

Build 3: The Radar Operations Center began releasing this software to field sites on 28 March 2003. Nearly all sites have loaded this software.

Changes In Build 3.0 that may affect RPCCDS users:

1. Additional information is being provided in the Velocity Wind Profile (VWP) tabular alphanumeric block. The alphanumeric format contains all wind data derived by the Velocity Azimuth Display (VAD) algorithm for the current volume scan. However, if there are no valid VAD winds in the volume scan, the VWP product will not contain VAD Algorithm Output page(s). See the Build 3.0 RPG to Class 1 User Interface Control Document (ICD) and the Product Specification ICD for additional information. They are available for download at: http://www.roc.noaa.gov/ssb/cm/icd_downloads.asp.

2. Correction to the Digital Precipitation Array (DPA) product. This problem occurred occasionally in widespread precipitation where the DPA product would overflow its product buffer which would make the product unavailable for distribution or would appear as a corrupted product. Thus, in Build 3 users should not receive corrupted DPA products.

3. Elimination of Precipitation Residuals In Precipitation Processing System (PPS). This corrected a problem where the PPS algorithm might yield very low levels of artificial accumulation in the hourly-based products (e.g., One Hour Precipitation (OHP); Three Hour Precipitation (THP); User-Selectable Precipitation (USP); Hourly Digital Precipitation Array (DPA)) that are of a similar appearance to accumulation attributed to ground clutter or anomalous propagation. These "residuals" were normally quantitatively trivial and removed by a filter that eliminates all trace accumulation amounts. However, in situations of prolonged rainfall events in which the PPS ran for extended hours without the Precipitation Category resetting to 0 ('No Rain'), the residuals may become widespread and may exceed the trace-level filter, making them appear as precipitation when they should not. Besides yielding a visually misleading indication of the actual precipitation field in the graphical accumulation products, these residuals may yield erroneous quantitative precipitation amounts in the digital PPS accumulation products. Thus, in Build 3 these residuals should not appear in the precipitation accumulation products.

Build 4: The Radar Operations Center began a beta test of Build 4 software to 6 field sites (Atlanta, GA, Knoxville, TN, South Kauai, HI, Sacramento, CA, Beale AFB, CA, and Reno, NV) in a phased approach on July 9, 2003. The beta test has been successful and the Build 4 software is scheduled to be released to the remaining field sites beginning 29 September 2003. The software is released to approximately 20 sites per week. Sites have 60 days after receipt of the software to load it on the RPG.

Changes in Build 4.0 that may affect RPCCDs users:

A change to the Precipitation Rate/Accumulation algorithm-task of the WSR-88D Precipitation Processing System (PPS) corrects the cumulative effect of slight truncations occurring during the determination of accumulations. This problem in some cases might contribute to an underestimation of rainfall. The degree of the problem will vary with the meteorological situation and the product, with the greatest impact experienced in hourly-based products (e.g., One Hour Precipitation (OHP); Three Hour Precipitation (THP); User-Selectable Precipitation (USP); Hourly Digital Precipitation Array (DPA)) during sustained, light precipitation events and the least impact experienced in the Storm Total Precipitation (STP) product during short-lived, heavy events. In worst-case situations, the impact of the problem can be quite substantial, with up to 2 mm of accumulation being lost per hour in the hourly-based products. The DPA product alphanumeric layer has been changed to include a maximum of 18 layers; prior to Build 4 the maximum was 15. This makes for possible larger products. The version number has been updated from 1 to 2 to reflect the difference. Also, the Supplemental Precipitation Data (SPD) product has been modified to include up to 16 (formerly 13) Rate Scan entries in the PPS Supplemental Data portion of the product (the version number has not changed). Refer to the Build 4.0 RPG to Class I User ICD and the Product Specification ICD for additional information (available in late September at: http://www.roc.noaa.gov/ssb/cm/icd_downloads.asp).

## PLANNED CHANGES:

Build 5: The Radar Operations Center plans to begin a beta test of Build 5 software to select field sites, locations to be determined, in January 2004. The software is scheduled to be released to field sites beginning 31 March 2004.

Changes in Build 5.0 that may affect RPCCDs users:

1. Implementation Of Two New Volume Coverage Patterns (VCPs).

   a. VCP 12, a 14-elevation scan VCP requiring 4.1 minutes to complete will be implemented. This means the products RPCCDS users receive may be coming as frequently as 4.1 minutes and some of the scanning angles will change. The NWS plans to transmit data from the 4 angles of VCP 12 that are the closest is the legacy angles. While VCP 12 will have the same number of elevation scans as VCP 11, denser vertical sampling at lower elevation angles will provide better vertical definition of storms, increase detection capabilities of radars impacted by terrain blockage to improve rainfall and snowfall estimates, result in more storms being identified, and provide quicker updates. More detailed information on this VCP can be found at: http://www.roc.noaa.gov/app/vcp/index.htm (VCP Gamma Deep Convection) and at: http://www.roc.noaa.gov/app/vcp/IIP1_22.pdf (See section 3, VCP Gamma). The NWS is preparing estimates on the anticipated change in the amount of data that will be sent to RPCCDS users with this change.

b. VCP 121, a 9-elevation scan VCP will be implemented. This VCP has the same elevation scan angles as VCP 21, but has 20 scans of data, vice the 11 scans VCP 21 has, and requires 5 minutes to complete vice the 6 minutes VCP 21 requires. This VCP will implement the multi-pulse repetition frequency dealiasing algorithm (MPDA) which will help mitigate range folding and velocity aliasing (the Doppler Dilemma). The product data created with this new VCP will not change for RPCCDS users, but the data should be higher quality and more usable. The NWS is preparing estimates on the anticipated change in the amount of data that will be sent to RPCCDS users with this change.

2. Implement Field Site Ability To Specify Default Precipitation VCP. For the first time, sites will be able to set the default VCP the radar goes to in precipitation events. In the past, VCP 21 has always served as the default VCP. It is expected that some sites will adopt VCP 11 or the new VCP 12 as the default in order to obtain faster updates and have greater vertical resolution. The NEXRAD agencies are investigating the impacts and benefits of establishing criteria for which VCP to use as the default.

3. Implement the Enhanced Preprocessing (EPRE) algorithm to replace the legacy Precipitation Processing System (PPS) Preprocessing Algorithm. The EPRE is required to support the new VCPs being implemented. In addition, while maintaining the functional philosophy of the legacy Preprocessing Algorithm (the reflectivity data used to generate precipitation estimates should come from the lowest uncontaminated, unblocked tilt), the EPRE applies refined logic and new information to generate enhanced Hybrid Scan reflectivity data, thereby improving radar rainfall estimates and Radar Coded Message products. The EPRE: (1) Uses AP/Clutter identification from the Radar Echo Classifier (REC) to accurately remove clutter contamination on a bin by bin basis. (2) Uses radar blockage information that has far higher precision and twice the spatial resolution of the legacy Occultation data. (3) Is not linked to the Precipitation Detection Function. Rather, independent of radar mode, similar logic based on the Hybrid Scan reflectivity data inside the EPRE generates information needed by other legacy PPS algorithms. The Hourly Digital Precipitation Array (DPA) product, One Hour Surface Rainfall Accumulation (OHP) product, Storm Total Rainfall Accumulation (STP) product, Supplemental Precipitation Data (SPD) product, Digital Hybrid Scan Reflectivity (DHR) product, and Digital Storm Total Precipitation (DSP) product have been significantly modified to reflect removal of numerous supplemental and adaptation data fields in the alphanumeric portions of the products, and replaced with new fields. The version numbers for these products have been updated to reflect the differences. Refer to the Build 5.0 RPG to Class I User ICD and the Product Specification ICD for additional information. (available in late March 2004 at: http://www.roc.noaa.gov/ssb/cm/icd_downloads.asp).

## POSSIBLE/TARGET CHANGES:

Build 6: The targeted contents of Build 6 have not been finalized. It is possible that some of the changes listed below will be included and a beta test of Build 6 software to select field sites, locations to be determined, will begin in July 2004. The software will be released to field sites beginning the end of September 2004.

1. Implement a snow accumulation algorithm. This algorithm will have hourly- accumulation products like those of the legacy precipitation products. The snow algorithm will use the EPRE that will be implemented in Build 5. It is not known at this time if the snow accumulation products will be added to the RPCCDS product list.

2. Implement the interface to the Open RDA. Beginning in September 2004, Open RDA hardware and software will be deployed The deployments should be completed by the end of 2005. Though no new RPCCDS products will appear in Build 6 due to the Open RDA, there should be improvements in radar data quality due to the newer science and capabilities of clutter detection and cancellation and other data quality features the Open RDA will possess.

## ADDITIONAL INFORMATION:

Changes made to the WSR-88D software are in response to NEXRAD agency approved requirements. The list of approved changes are approved about 11 months before the software is released to the field. Thus, software contents beyond Build 5 is a projection/target, subject to final approval and change.

The Radar Operations Center (ROC) has created a new URL (http://www.roc.noaa.gov/ops/ssm.asp)for users to obtain:

(1) A list of sites and which RPG software build the site is using, and
(2) A list of sites and which volume coverage pattern the site is using, during the last hourly ROC call to the RPG.

Warning Decision Training Branch training materials prepared for WSR-88D NEXRAD agency operators can be found in the Tech Updates section at the following URL: http://www.wdtb.noaa.gov/. While many of the changes discussed are not available on the RPCCDS, the training material provides information on new capabilities provided to NEXRAD Agency WSR-88D users.

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